

Linear Programming Word Problems

1. Jeanne makes banana bread and raisin bread to sell at a carnival. A loaf of banana bread requires 2 cups of flour and 2 eggs. A loaf of raisin bread takes 3 cups of flour and 1 egg. Jeanne has 12 cups of flour and 8 eggs on hand. She makes \$2 profit per loaf of banana bread and \$2 per loaf of raisin bread. To maximize profits, how many loaves of each type should she bake?

	Banana	Raisin	Constraint
Flour	2	3	12
Eggs	2	1	8

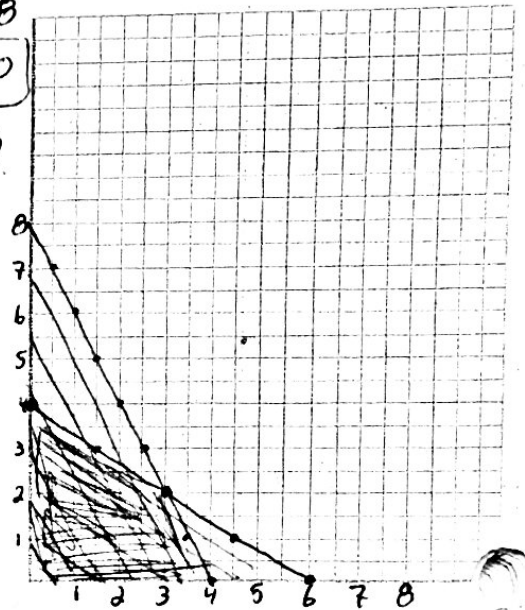
$$(0,0) = 0$$

$$(0,4) = 8$$

$$(3,2) = 10$$

$$(4,0) = 8$$

3 Banana + 2 Raisin



Profit $P = 2b + 2r$

$$2x + y \leq 8$$

$$y \leq -2x + 8$$

$$2x + 3y \leq 12$$

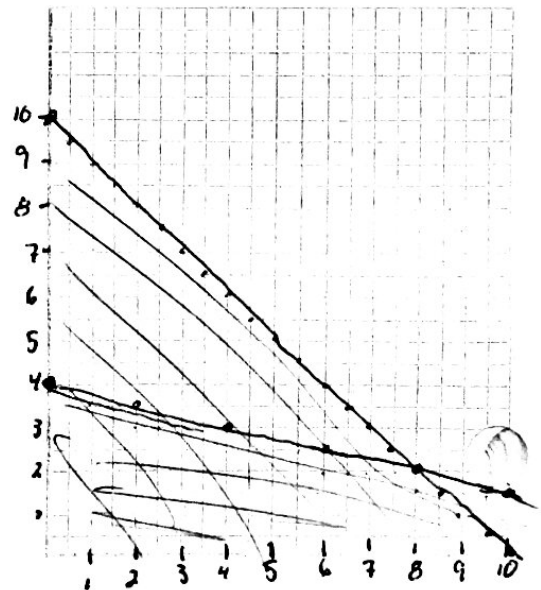
$$3y \leq -\frac{2x}{3} + \frac{12}{3}$$

$$y \leq -\frac{2}{3}x + 4$$

2. Miss Evans makes two types of wood clocks to sell at local stores. It takes her two hours to assemble a pine clock, which requires 1 oz of varnish. It takes two hours to assemble an oak clock, which takes 4 oz of varnish. Miss Evans has 16 oz of varnish in stock, and she can work 20 hours. If she makes \$3 profit on each pine clock and \$4 profit on each oak clock, how many of each type should she make to maximize her profits?

	Pine (x)	Oak (y)	Constraint
Time	2	2	20
Varnish	1	4	16

Profit: $P = 3P + 4K$



$$2x + 2y \leq 20$$

$$2y \leq -2x + 20$$

$$y \leq -x + 10$$

$$(0,0) = 0$$

$$(0,4) = 16$$

$$(8,2) = 32$$

$$(10,0) = 30$$

$$x + 4y \leq 16$$

$$\frac{4y}{4} \leq \frac{-x}{4} + \frac{16}{4}$$

8 Pine and 2 Oak

$$y \leq -\frac{1}{4}x + 4$$

The Southern Bagel Factory makes two types of bagels, plain and blueberry. The oven can cook up to 200 bagels per hour. Blueberry bagels each require 2 ounces of dry ingredients and plain bagels each require 1 ounce of dry ingredients. The staff can prepare at most 300 ounces of dry ingredients. The profit on plain bagels is \$0.25 and the profit on blueberry bagels is \$0.36. How many of each type of bagel should be made per hour to maximize profit? What is the maximum hourly profit?

	Plain	Blueberry	Const
dry	1	2	300
Time	1	1	200

$$P = 0.25 \text{ Plain} + 0.36 \text{ Blueberry}$$

$$x + 2y \leq 300$$

$$y \leq -\frac{1}{2}x + 150$$

$$(0, 0) = 0$$

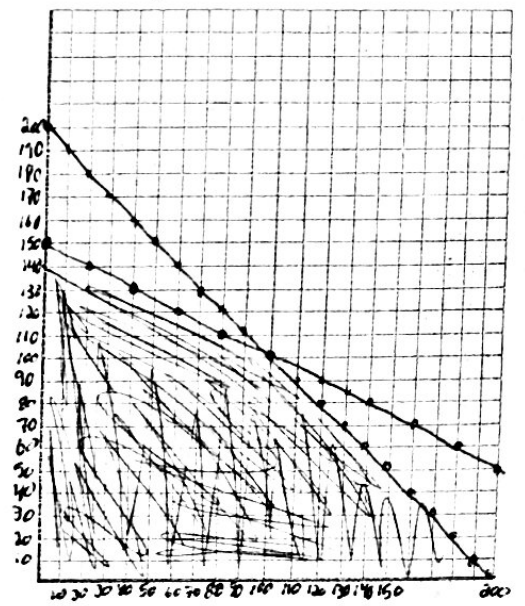
$$(0, 150) = 54$$

$$x + y \leq 200$$

$$y \leq -x + 200$$

$$(100, 100) = 25 + 36 = 61$$

$$(200, 0) = 50$$



1. The area of parking lot is 600 square meters. A car requires 6 square meters. A bus requires 30 square meters. The attendant can handle only 60 vehicles. If a car is charged \$2.50 and a bus \$7.50, how many of each should be accepted to maximize income?

	Car x	Bus y	Constraint
Space	6	30	600
vehicles	$1x$	$1y$	60

$$P = 2.50c + 7.50b$$

$$6x + 30y \leq 600$$

$$\frac{30y}{30} \leq -\frac{6x}{30} + \frac{600}{30}$$

$$y \leq -\frac{1}{5}x + 20$$

$$(0, 0) = 2.5(0) + 7.5(0) = 0$$

$$(0, 20) = 2.5(0) + 7.5(20) = 150$$

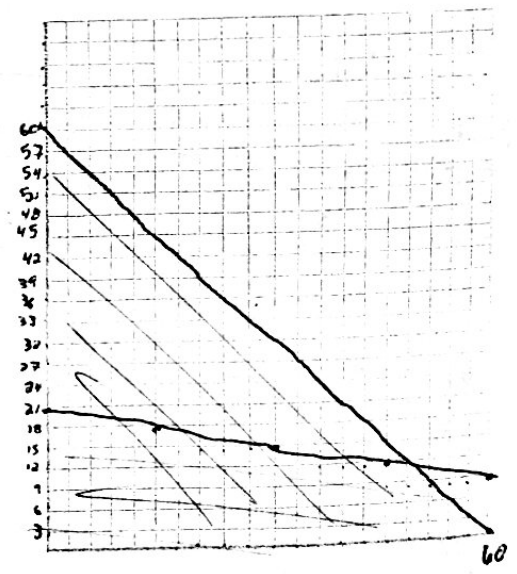
$$(50, 10) = 2.5(50) + 7.5(10) = 200$$

$$(60, 0) = 2.5(60) + 7.5(0) = 150$$

$$x + y \leq 60$$

$$y \leq -x + 60$$

50 cars and 10 bus



$$\frac{4}{5}x = 40$$

$$x = 50$$